



Ø BEAT



COLORADO SPRINGS,
COLORADO

AUGUST 1986

PIKEYS PEAK RADIO AMATEUR ASSOCIATION, INC
P.O. Box 16521
COLORADO SPRINGS, CO 80935

FIRST CLASS MAIL



Ø BEAT



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ZERO BEAT is published monthly in the interest of the members of the Pikes Peak Radio Amateur Association, Inc., P.O. Box 16521, Colorado Springs, Colorado 80935. Cost is 50¢ per month for non-members or a \$4.00 per year subscription. Permission is given to reprint articles or excerpts provided credit is given. Deadline for submission of articles is the 21st of the month. Classifieds accepted anytime.

The Pikes Peak Radio Amateur Association meets on the second Wednesday of each month at Giuseppe's Depot Restaurant at 10 S. Sierra Madre at 7:30 p.m. All amateurs and interested parties are invited to attend.

Editor: Phil Somers VE1ARC, 1075 Allegheny Dr. Colorado Springs, CO 80919 590-7136

A Few Words From Your Board Members This month: Les, KCØNC - President

Here it is the middle of July and half way through 1986. Our club has been very busy in the last 3 or 4 months with many public service activities and club events. Even though it will not be long before summer is over, there are still many things that we as amateurs participate in. We still have the club picnic, a motorcycle race, the autumn Teller County Hill Climb, and planning the club Christmas party, to mention a few. Our club has been, and hopefully will continue to be, very active in the community.

In the past events, our members have come through and provided the excellent help as needed. I would not try to name those who have done the most, because if it had not been for the assistance of everyone, many of those projects could not have been successfully accomplished.

One thing that I would like to ask each and every member is to give consideration to the needs of the club for the future. One of the main things is the expenditure of those funds that we are required by law to make. I am sure that there are many good ideas that have not been expressed, because someone may feel that they would not be a popular benefit. If you do not come forward with your idea, there is no way of determining its merit. Therefore, speak out and let your thoughts be known.

This letter from the President is only the first of a series of letters from your elected officers and board of directors. Next month, we hope to continue with another letter from an officer, and I only hope that he has as much trouble putting his thoughts in to words as I have had.

73's. Les Borst - President

PIKES PEAK HILL CLIMB

THANK YOU TO ALL WHO HELPED WITH THE 1986 PIKE'S PEAK AUTO HILL CLIMB. OUR WORK WAS APPRECIATED BY ALL OF THE HILL CLIMB OFFICIALS. THANKS AGAIN FOR A JOB WELL DONE.

MALCOLM-KE9S

P.S. ANYONE WANTING TO HELP ON NEXT YEARS RACE CONTACT ME ASAP. I PLAN TO START EARLY FOR NEXT YEAR. HIHI

"LOCAL QRM"



"VIEW FROM THE PEAK"
by George Hinds, NSCIX/Ø

From time to time, in earlier columns, I've written about the value of taking your rig along on trips for both safety and convenience. Beyond those reasons, there are others - how it can aid in meeting interesting people, in making new friends and, last but not necessarily least, help keep you awake as you travel cross-country.

Incidentally, how many of you know of a ham who, when traveling, for some strange reason will install a CB in the car but NOT a two-meter rig? Outside of use to exceed speed limits and avoid detection by police, or to communicate with a non-ham in a convoy-type trip, what would cause a ham to choose CB and leave ham radio behind?

Well, that's another subject, and one to spark some strong opinions. So let's get back on the track now and head down memory lane.

SOME INTERESTING PEOPLE I'VE MET

#1 -

One day driving east on US-30 near Fremont, Nebraska, I was being passed by a freight train on the nearby tracks. My 2M rig was scanning and stopped on 146.52 as the caboose went by with someone calling for "the grey Pontiac with ham radio antennas on the roof."

It so happened a trainman riding the caboose was an amateur and on this trip had brought along his 2M rig. When he saw my car, he decided to give a call on we had a most enjoyable contact talking about amateur radio and railroading - topics of mutual interest, obviously. I learned the train originated in California and was enroute New York/New Jersey; it was loaded with container freight from the far East and highway trucks full of produce from California growers. Since some railroads prohibit using radios except for company business, I'll not mention his call and name here. But had either of us not brought along a 2M rig, what was a most enjoyable contact would not have taken place.

#2 -

While headed for the Pacific Northwest recently, a call on the 01/61 Vail repeater brought a response from WØKEA. It turned out that Phil was originally from Akron, Ohio, and was familiar with many of the repeaters and amateurs from northeast Ohio "8-land" which gave us something in common from the start, for that was my home for over 15 years.

He has been in Vail for many years and is a ski instructor on the slopes during ski season; at other times he is in construction. From him I learned of the active UHF repeater at Vail operating on 448.650 with coverage equal to the 2M system. We enjoyed talking about repeaters, my being a confirmed "non-ski" type, and the work being done on I-70 in the Glenwood Canyon area. Without the rig in the car, I most likely would have spent my time in the Canyon silently cursing construction delays and destruction of native scenic views by "super roads."

#3 -

While entering Glenwood Springs enroute Provo, Utah, I struck up a conversation with WBSONT, Sam Wolfe, who was from Cleveland Heights, Ohio - a long way from home indeed. We talked about what brought him on this trip: the "Peace March."

I learned that Sam had flown to Los Angeles to join the marchers and provide communications along the route. VHF & HF rigs were in use for safety, convenience and necessity as required by the conditions encountered traveling on all kinds of roads and in all kinds of weather.

As we chatted, Sam mentioned that he lived near Cedar and Lee Roads, and we discovered that we had many ham friends in common from the Cleveland area. One of those mutual friends was W8BU, who was one of the amateurs participating in the transatlantic test of December 1921, when radio communication was successfully established between Scotland and the U.S. I'm glad I had my rig along this trip.

As we talked more about the Peach March, I learned the marchers were halted for the night at Glenwood Springs in a camp. Sam told me there were about 500

people involved, with half marching and half in the support team - driving supply trucks, setting up and tearing down overnight camps, cooking, sanitation and in educational projects along the way.

He plans to travel all the way - in Cleveland he will spend some time at home and in Washington, DC, he will visit his oldest son. Based on newspaper and TV reports, Sam has undergone storms, even tornadoes, on the trip in his effort to contribute his skills in communicating to the cause of the Peace March. Can you imagine the tale he'll have to tell when the march ends? Perhaps the story will appear where we can all read about it.

#4 -

While northwest of Salt Lake City enroute Seattle traveling along I-84 (an unspectacular scenic route) I struck up a brief repeater contact with John, WA0DYU, who was atop a mountain at a remote microwave/VHF radio site. He was servicing microwave equipment for the Union Pacific RR. John lives at and works out of Pocatello, Idaho. He confirmed what I suspected: today's railroad electronic tech needs to know not only two-way radio, but also microwave, packet, teletype and fibre optics.

#5 -

On a trip passing Boise/Nampa, Idaho, I met on the air W7OZJ, Paul Brickey, a piano tuner - the first piano tuner I'd ever met since school days many years ago. A handy fellow to have for audio and tone reports on the repeater! Our conversation turned around to the purpose of my trip - to visit the big "Steam Locomotive Parade" at Vancouver.

As we talked, Paul told me about a railroader active on the local repeater: W7PCP, Gerry Moser. He retired after 40 years of service as agent/telegrapher/operator for the Union Pacific in Idaho. Soon I had Gerry on the repeater; he told me that his Dad had been a telegrapher and taught him Morse code. He went to work for the UP while still in school during WW 2, took a leave to finish school, then spent two years in the Navy.

Upon returning to the UP, he held a steady job for the rest of his career - a

total of over 40 years. Besides amateur radio, he enjoys model railroading. He has a complete HO layout constructed around the walls in his "radio room". Suffice it to say we "jawboned" for the time it took me to be far into Oregon and out of repeater range of Boise, for some years ago while living in Cedar Rapids, Iowa (home of Collins Radio) I too had an HO model railroad circling the basement wall.

(Note: a nice touch encountered upon entering Washington was the frequent new signs giving the mileage remaining to Vancouver and EXPO 86. - Certainly a friendly and helpful gesture to Canada).

#6 -

Enroute on I-84 through Washington I came upon what looked to be acres and acres of antenna farms - perhaps for some secret, low-frequency military purpose? Poles were planted vertically in the ground about 15' high and about the same distance apart, row upon row, acre after acre. From the pole tops interconnecting wires were strung. What could it be? How to find out? Why, call on the local repeater, of course! You know that's where the local "answerman" hangs out...

Well, I quickly got my answer: no, not antennas - but something equally dear to many hams - it was a "hop" farm for growing the hops that go into our beer! Apparently, farmland around Pasco and Richland, Washington, is the largest area in the country devoted to growing this grain that is so vital to so many...after all, where would Golden, CO., be without hops? So, you see, 2M FM can educate!

#7 -

To get to Victoria, BC, one has to either swim, fly or take a ferry - so in line for the Port Angeles - Victoria ferry went a grey car with many antennas. In the same line: VE7AZN and wife, going home after a visit in the States. Ray lives in Victoria and we four had a nice chat while crossing the Straits of San Juan de Fuca and plenty of talk about ham radio, repeaters, the beautiful city of Victoria and EXPO 86.

For the rest of our stay, I had a friend in Victoria - we stayed in contact

via the 145.41 Victoria repeater through the morning daily net of mostly retired hams. We checked in daily and received tips on where to eat, what to see, etc.

Later, while at Vancouver, in need of directions, VE7BBB, Ray, drove out of his way to meet and show us shortcuts to points of interest we otherwise would have likely missed, proving again how valuable a 2M FM rig can be with so many new friends waiting to be of help. Remember: in ham radio, strangers are but friends you have yet to meet.

Well, these are but a few of my recent interesting contacts while mobile. I hope I've stirred your desire to take along your 2M (and 220 and 440, too) rigs when you next head crosscountry. Remember: you, too, can avoid "highway hypnosis." 73, and ENJOY 2 FM! N8CIX

VHF AND ABOVE by Ron Deutsch NKØP

Bird slugs can be modified to read different power levels for full scale. For example, a 25 watt slug can be made to read 50 watts F.S. Changing the calibration resistor inside the slug is all that is needed in most cases. Adjusting the pick-up loop may also be necessary.

These slugs can also be modified for different frequency bands. Low power VHF slugs can be used to make UHF or Microwave slugs. There are many odd frequency and power level slugs floating around at Ham Fests that are perfect for conversion.

All these slugs are basically the same inside. They have a pick-up loop that samples RF which is rectified. A calibration resistor sets the F.S. reading on the 30 ua. meter movement.

The following describes using a 5C element (5 W, 100-250 MHz.) to make a 5 Watt, 2304 MHz slug.

To open a slug: 1-Pry off the Model # plate with an awl or 2-Heat up the top of the slug on a hot plate to soften the glue or 3-Drill and tap a 2-56 hole in the cover and pull it off. Remove the screw inside the cover. This exposes R2 and D1. Next remove the two screws holding the Teflon cover on. This cover encloses the pick-up loop L1 and a load resistor R1.

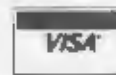
Remove L1 (2 turn coil) and the plastic coil form by cutting it out with a diagonal cutter. Remove calibration resistor R2. Replace L1 with a brass strip as shown. Replace R2 with a 3.3 K ohm resistor. R2 can be "adjusted" by using a resistor of lower value and filling a groove in the carbon to raise the resistance.

The size and placement of L1 and the value of R2 was found experimentally as follows: I replaced the calibration resistor R2 with a 10K, 10 turn trimpot. Then different sizes of brass strips were tried. The slug is partially assembled each time and checked in a Bird 43 which is connected to a calibrated load and a HP power meter. The shape and size of L1 was adjusted until both the F.S. and linearity were correct. Reasonable tracking can be achieved by trial and error. Lastly, the directivity is checked with the slug in the reverse position.

The accuracy and linearity depend on how long you spend adjusting L1 and R2. Performance is at least as good as my other slugs.

Re-assemble the slug and check its performance again. Re-adjust R2 if calibration is off. Change the Model # plate to indicate the correct frequency band, and you're done.

Many inoperative slugs can be repaired rather easily. Dropped slugs usually have a broken L1 coil. Some have bad solder joints. Don't be afraid to open one up. It's no good if it's broken anyway.



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DON — WØGOH

2838 N. PROSPECT, COLORADO SPRINGS, CO 80907

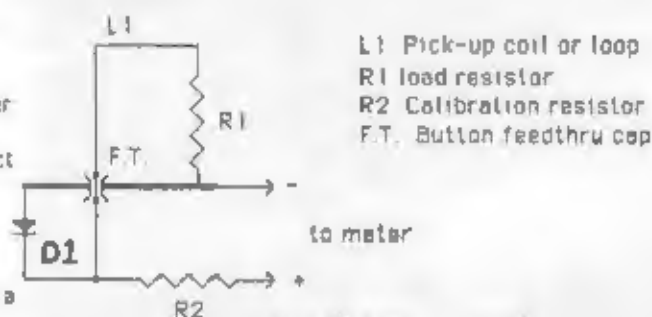
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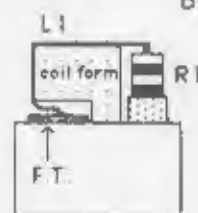
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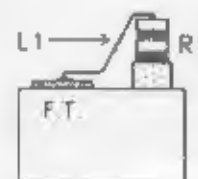


Bird 43 Slug schematic



Remove L1 and coil form
Remove R2 inside slug housing

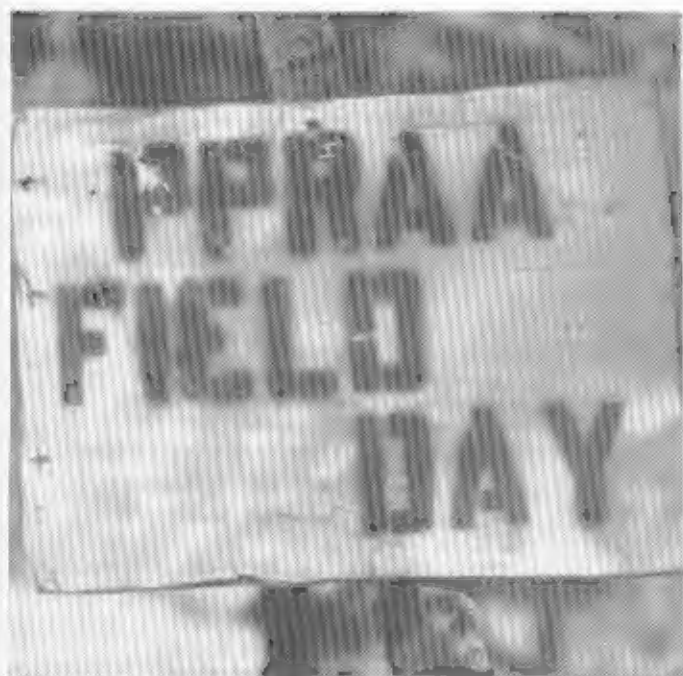
Replace R2 and L1 as shown



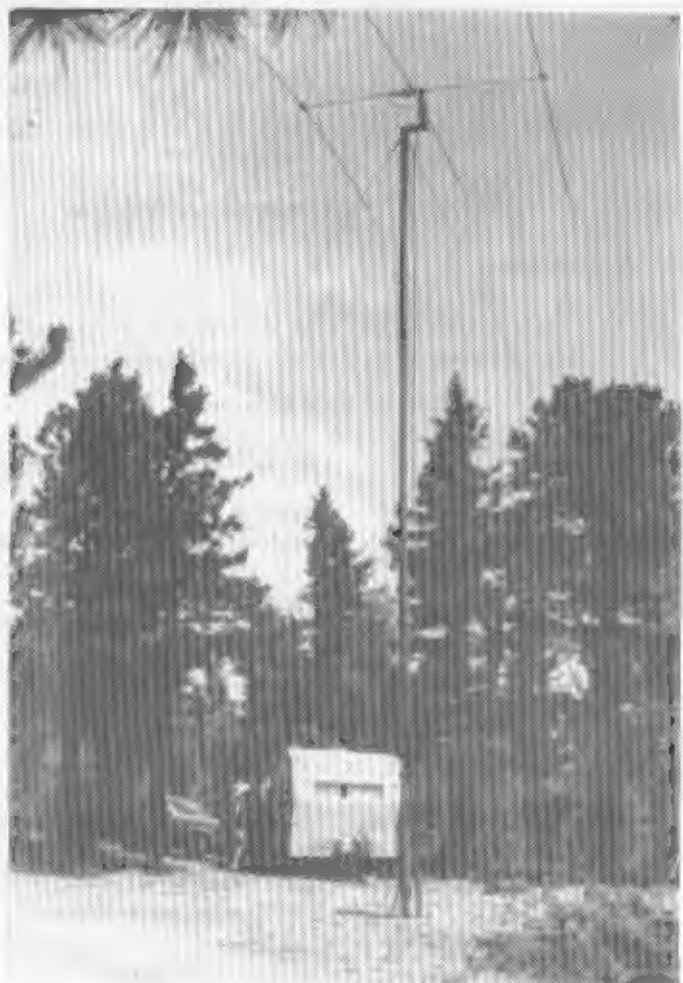
L1 0.65" X 0.050" X 0.010"
thick brass strip shaped as
shown between F.T. and R1

R2 3.3 K ohm 1/2 watt
adjusted as necessary

WAS:JUF 1985



The Pike's Peak Radio Amateur Association
Field Day 1966 W-A-S-H-T-U



Max KDØEL made excellent use of the beam
with lots of contacts at the CW station.



Susan KA7NMX checks out the new paint job
on the club trailer.



Frank KAØYEM, one of the club's newest
hams, working high-speed CW at the Novice
station.



Tom AD6D and Pete N6LA did much of the work to make Field Day 86 a big success.



Chris W3/DHU found time to take these nice photos and to tow the club trailer.



Mike K0TER demonstrates how a high-tech computerized station should be operated.



Jake N0CYR and Jody KA0R0Z discuss the finer points of the bear pancake receipt.

KOLGRADO

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Valued Customers,

Two years ago we brought national pricing to Denver. We also introduced open pricing where all ham equipment is clearly marked with its nationally discounted price.

Your response has been tremendous! Because of this we are pleased to announce that we are expanding to larger and more convenient facilities to serve you better. We will be moving about June 10 to 525 E. 70th Street with easy freeway access and within a few yards of the intersection of I25, I76 and the Boulder Expressway.

Our new local phone number will be 268-7373. Please pardon any delays during our move and thanks for your support!

73's

Ray Doyle
KM0G NN0W

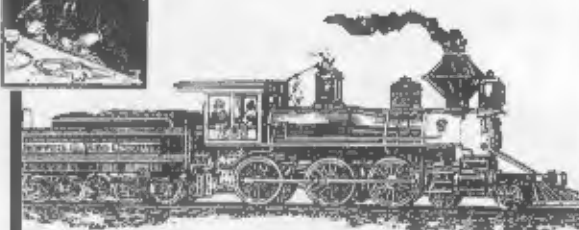
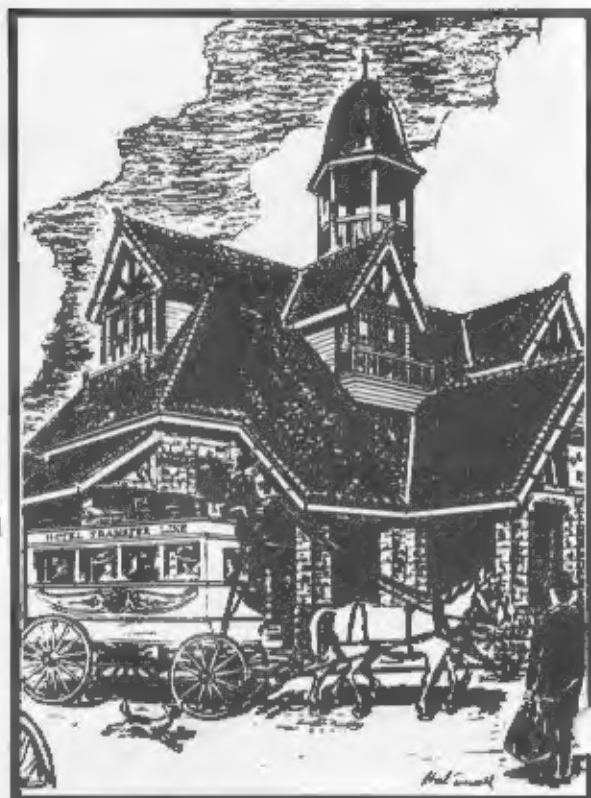
Jim
N0BLU

Bob
WD0GSE

P.S. You guessed it! Our new location will have ABSOLUTELY NO CITY SALES TAX!

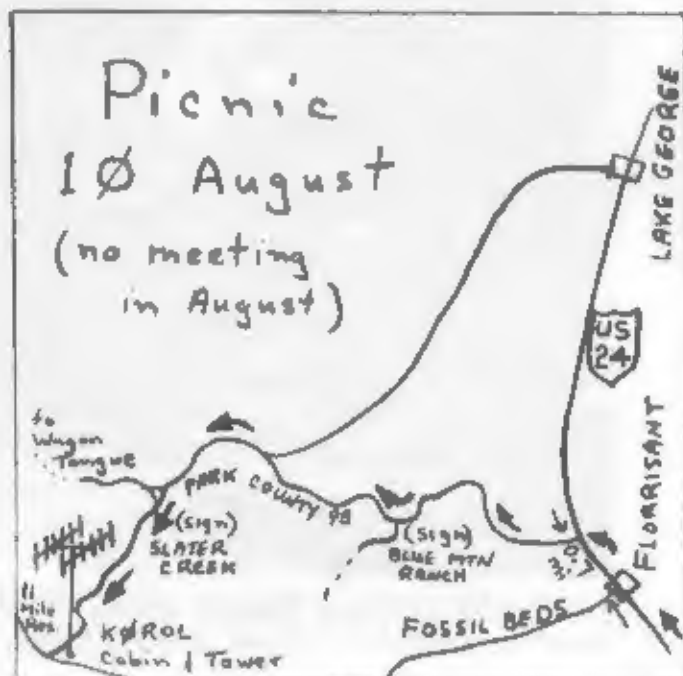
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Field Day 1986 - Contacts

CW	-	340
Novice	-	19
Packet	-	10
SSB	-	560
Total		929

ANTENNAS

By Chris Smith - WBØDHU

Antennas have always been the most fascinating part of radio to me. When I first got my Novice license and was just beginning to grasp electronics, it was clear that there was something different about antennas. By all rights, for example, a dipole is just an open circuited piece of wire and ought to do nothing when connected on the end of a piece of coax - but it sure seems to do something. Likewise, any sensible interpretation of a folded dipole says it is a short circuit-any transmitter hooked to one is clearly doomed. And yet the Viking seemed to load one up just fine.

After a few years of college, with some physics and math courses, antennas were no longer quite so magical, and were becoming, well, at least plausible. By the time I was in graduate school, I had decided it was of little hope to understand why they worked. In the finest tradition of physics (in my mind at the time), it was only important to quantify how they worked. Simply find the underlying mathematical scheme and all would be well. Really it was just plug into the formula and crank, but I did begin the task of facing Smith charts and other oddities.

That proved to be of some worth, for when the time came to face the world and get (in the worst tradition of physics, in my mind at the time) a job, my acquaintance with Smith charts and words like yagi managed to get me a job as an antenna engineer. The brave company taking a chance on me was Technology for Communications International, or TCI. They are little known to hams, but are widely known in commercial radio. In all honesty, I really do think they make the best commercial HF antennas, bar none.

They taught me more than I ever thought I wanted to know about antennas. It was thrilling, though, as more and more of what I had been taught about waves, circuits and physical principles began to unify. Gradually my attention focused more on the methodology of computer solutions to antenna problems than engineering, so after five years with TCI I left. I still enjoy a good antenna

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design, or the challenge of an antenna problem, so I would like to take the opportunity of the PPRAA newsletter to write a column on the subject from time to time. You can help by contributing your designs, or questions, or enthusiasm for the subject.

In closing, I would like to pass on one technical piece of information. There is a fundamental rule of antennas to keep in mind. I've never seen it violated in any design, not even one of my own. The rule is, every antenna design trades off size, bandwidth and efficiency. The size of an antenna is measured in wavelengths, the bandwidth is the frequency ratio at a given SWR level, and the efficiency is the amount of RF that gets out rather than heating some part of the antenna system. Broadband, efficient antennas are big. If you try to push one quantity, you pay in one or both of the others. From time to time you may see a host of other antenna rules mentioned but if any violate the fundamental rule, you might as well forget it.

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DIABLO daisy wheel printer (broken). \$50.
Ken, WA6TTY 687-1428

CDE 44 Rotor with control box. New condx.
Sale or trade. Ron, NK8P 593-8352

CUSHCRAFT 5-band vertical. \$35.
Harley, WB8PAN 471-7106 H, 577-1266 W

ICOM 215 2m portable (needs tune-up). \$45.
George, N8CIX 687-2610

SHAN 700 CX transceiver. \$200.
Jake, N8CYR 634-2223

ISDPOLE 2 meter antenna. \$20.
Malcolm, KE9B 488-2071

Metal office desk, large. \$35.
Don, KE8BJ 520-9955

ICOM IC-745 XCVR. Hal CWR-6850 RTTY
terminal. 12VDC. Allan, KDSZW 597-3745

TEMPO-1 HF rig. Good condx. AC and DC
supplies. \$225. David, WB8BDW 435-9593

WANTED. 60 ft tower.
Bob, NT8A 687-2020

WANTED. KW Johnson matchbox.
Smitty, WB8LTV

ESTATE OF W4LXZ

Hal ST-6000 FBK Deed + instruct. \$450.

AZDEN PCS 4000 2m FM transceiver. \$250.

Yaesu FT 757 BX all-mode xcvr with
mike and FP 757 HD power supply. \$850.

INFO-TECH M280F, US1 monitor EV 9031,
INFO-TECH keyboard 300 with book. \$600.

contact: Mrs Carl Carlton
3625 San Clemente Dr.
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+ (in lieu of regular meeting) +
+ +
+ PLACE: Oak's (K8ROL) cabin. (map) +
+ +
+ CAMPING: Oak says you can camp +
+ overnight either night. +
+ +
+ DETAILS: All food and refreshments +
+ provided by the club except +
+ please bring a covered dish +
+ or dessert. Arrive about +
+ 10:30 AM for lunch at noon. +

MINUTES OF JULY GENERAL MEETING submitted by Al N8CMM, secretary

The general meeting of the Pikes Peak
Radio Amateur Association was held at
Bluespessa's Old Depot Restaurant, Wednesday
evening 9 July 1986. Meeting was called
to order by the president Les KC8NC at
19:45. We had 40 members and 16 guests
present. All club executives and board
members were asked to introduce
themselves. The minutes of the last meeting
were approved as printed in 8-Beat.

Committee Reports

Treasurer - Bud N8DDF: Previous balance of
\$2857.69, income of \$185.50 with expenses
of \$521.79, leaving a balance of \$2521.40
as of 9 July 86.

RFI - Ron NKØP: 2 cases, one of which involved a ham with 500W on 160 meters interfering with VCR and garage door opener. Partially fixed. Suggestion: liberal use of toroids.

Field Day - Tom ADØQ: Thanks to all the participants. Approx. 1000 contacts. Hope to do even better next year.

Pikes Peak Hill Climb - Malcolm KE9B: 53 volunteers signed up. 80 cars entered. Thanks to Doc for his help from last year.

Colorado Council of Amateur Radio Clubs (CCARC) - Bud NØDDF: Two up-coming meetings on 26 July and 10 August.

Public Service - Mike KØTER: Nil.

Deaf and Blind School - Jim WA9ABB: Closed for summer. Jim still working with one in his home.

Ø-Beat - Phil VE1ARC: Next month will try a want-ad column.

ARES - Jake NØCYR: Has meetings scheduled with Medical Emergency Group and civil defense. Met on 9 July run from civil defense site.

Club Trailer - Pete NØLA: Thanks to those who helped with painting.

Public Relations - Ron NKØP: The local newspaper let him down on Field Day coverage.

Old Business:

No word back from Darla on our request for more info on her wanting us to be AWARDS COMMITTEE for the Rocky Mountain section.

New Business:

A motion was passed that Malcolm, KE9B be re-imbursed for his expense for paperwork, etc for the Hill Climb of about \$50.

A request for a picnic chairman met with great silence. Picnic will be August 10 at Jak's cabin (KØROL).

Announcements:

Bud WBØTIB announced FM Association picnic on August 24.

Jim WA9ABB requested that anyone who needed a ride or could provide a ride to the club picnic to see a board member.

Bob NTØA reminded all of the Woodland Park hamfest 26-27 July.

Pete NØLA announced the VE testing on 16 August.

Prizes - Don NDØHWS: Winners were:

VE1ARC	Phil	ARRL Antenna book.
NØBYN	Carl	\$10. Walker cert.
KA7NNX	Sue	Ticket for HT.
WDØBSZ	Don	\$10. Centennial cert.
NØLA	Pete	Ticket for HT
NØSHF	Don	???
KCØTG	Harley	Floppy disk.

Program - Ron NKØP: VHF Contesting is one of Ron's most favorite endeavors and he passed on his enthusiasm. His presentation included a well-prepared handout that will surely be helpful to anyone taking up the sport. Very well presented Ron !!

MINUTES OF JULY BOARD MEETING submitted by Al NØCMW

The board meeting was held on Monday, 14 July 1986 at the home of Phil, VE1ARC. Those in attendance were Les KCØNC, Al NØCMW, Jim WA9ABB, Bud NØDDF and Phil VE1ARC. Al was instructed to send a letter to the Radio Amateur Callbook to correct the listing of WAØVTU, the club call. Al was instructed to purchase a WAØVTU rubber stamp for QSL cards, etc. It was decided to increase the publication of Ø-Beat by 50 copies for distribution to Radio Shack stores. The board decided not to purchase a general coverage receiver for a nursing home. The Christmas party was discussed. Les will try to find a chairman for it. A discussion was held on how to spend the raffle proceeds. The secretary was asked to get some info on the ARRL library package for possible donation to a local library. It was decided that the club would supply everything for the club picnic, except that everyone would be asked to bring a covered dish or dessert. Those attending the picnic are invited to come early, around 10:30 and plan to eat at noon.

The next meeting of the board will be at the home of Les KCØNC on 11 August 1986. The meeting was adjourned at 21:10.

MILEY'S RADIO

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New Kenwood TS 440S \$819 w/AT installed \$940.
Kenwood TS 940S \$1650. w/auto tuner \$1750-\$50 Factory Rebate.
Kenwood TS 430S w/FM board or mike \$699-\$25 Factory Rebate.
Kenwood TS 830S \$819.
PS 430 Power Supply \$134. — PS 30 \$125.
Kenwood PS 50 power supply \$175.
Kenwood AT 250 auto antenna tuner for 430S \$290.
Kenwood AT 130 tuner \$125 AT 230 Tuner \$170.
Icom 735 \$790.
Icom 746 \$819.
Yaesu FT 757GR \$750.
New "Amp Supply" LA 1000NT 160-15 meter 1200W PEP-800 DC QSK, no tune up, drives with 100W-list \$529 — SALE \$475
Amp Supply LK500ZB w/o QSK in stock w/10 meters \$950
Kenwood 4000A 2m & 440 FM Xcvr. Sale \$519
Kenwood TR 3600 440 MHz HT \$329-\$15 Factory Rebate.
Kenwood TR 2500A new HT w/extra battery \$307-\$15 Factory Rebate.
New Kenwood TR 751A 2 meter all mode \$519.
Kenwood TH21AT \$209. TH41AT \$219 — both with free extra battery and \$10 Factory Rebate.
Kenwood TM 2570A 70 watt 2 meter FM mobile \$429-\$40 Factory Rebate.
Kenwood TM 2550A 45 watt 2 meter FM mobile \$379.
Kenwood TM 2530A 25 watt 2 meter FM mobile \$349.
Santec 20T w/2 number memory dialer \$275 w/additional \$10 factory rebate.
Complete line of Tokyo High Power amps, preamps & tuners at lowest prices.
New Azden PCS 5000 \$285.
New Icom 28-132-174 MHz scan/receive 25W \$379.
New Icom 28H-same specs as Icom 28 w/45W \$399.
Icom 2AT HT Reg. \$269 Now \$205.
Icom 02AT \$309.
Icom 4AT \$245.
Icom 04AT \$339.
Icom 27A w/TTM \$348/Icom 27H w/TTM \$378.
Icom 47A \$425.
Icom 3200 2 meter/440 dual bander \$479.
Daiwa Meters, Switches & Rotors - In Stock
Mirage Amps - Low Prices - In Stock
New KDK FM 240 mini 25W w/TTM & LCD display, encoder/decoder TO 156 MHz receive \$320 w/o tone \$290.
New Yaesu FT 209RH 5 watt FM HT \$299.
Yaesu FT 2700RH 2 m-70 cm dual bander full duplex-free encoder \$579.
Now a factory dealer for Ten Tec — In Stock specials:
Corsair II HF xcvr. \$995.
Century 22 HF CW xcvr. \$49.
New generation Ten Tec 2591 2 m HT \$269. 1 demo unit \$250.
Astron PS — ALL AMP'S — Low Prices — Astron RS 50 and V50 In Stock
Now a factory dealer for Molex antennas—Special prices until 9/30—full line in stock.
Butternut HF6V 80-10 mtr. vertical \$175. Butterfly beam \$175.
KLM 160V 160/80/40 vertical \$88.
KLM 2M14C 2 mtr. circ. 14 ele. beam (oscar) \$88.
KLM 43518C 420-450 18 circ. 18 ele. beam (oscar) 118.
B&W AXS 160 shortened 160/30 mtr. dipole 95' long \$94.
B&W AXS 80 shortened 80/40/15 mtr. dipole 64' long \$94.
B&W AS 80 shortened 80/40/20 mtr. dipole 78' long \$94.
Welz test meters in stock.
New B & W V5 300 tuner—best 300W tuner for the price! Special \$79.
Amp Supply LA 1000A 1000W PEP amp—Special \$388.
Amp Supply AT 1200 Tuner Special \$175.
Now a distributor for Ameritron Amplifiers - AL 80A - 1 3-500Z - In Stock \$649
AEA CP-1 Computer Interface \$210.
AEA PK 64 packet/cw/rtty etc. controller \$210 — HF/M \$95.
AEA PK 64 system w/HF/M 64 installed \$310.
Factory Dealer for Kantronics — In Stock!
New Kantronics Packet Program—includes program for LUTU.
Kantronics Packet Controller version 2 w/HF/M \$185.
Kantronics interface for VIC 20 and others \$125.
Kantronics Universal Terminal Unit \$165.
Kantronics Hamtext Hamsoft \$89.

MFJ wet & dry dummy loads — In stock.
MFJ Tuners and Keyers — in stock.
MFJ 989 roller inductor tuner \$268.
MFJ 962 1.5 KW tuner-160 to 10 meters \$219.
New MFJ 1224 interface in stock w/free soft program Summer Sale-\$75.
MFJ 1229 interface w/free soft program Summer Sale-\$155.
In Stock! MFJ 1270 packet controller (TNC-2) clone \$319.

USED EQUIPMENT

Kenwood TR 2400 \$125.
Kenwood TH 21AT w/2 batteries Denso \$185.
Kenwood TR 2500 \$195.
Kenwood TM 211A w/TTM-like new \$275.
Kenwood TR 3600 — like new \$275.
Kenwood TR 4000A — like new w/TU4C encoder \$450.
Kenwood TS 520S \$350.
Kenwood TS 535S w/AT — Demo 1 1/2 hrs. operation \$995 Firm.
Kenwood TS 180S w/DFC, CW filter \$425. W/PS 30 supply \$485.
Kenwood TS 700A 2 meter all mode AC/DC \$275.
Kenwood 571 desk power supply/charger for TR 2400 \$35.
(2) Kenwood AT 250 auto tuners \$250 ea.
Kenwood PCTA phone patch \$30.
Icom PS 15 power supply \$95.
Icom 740 \$475.
Icom PS 20 p.s. \$150.
(IC 740 & PS 20 combo for \$600)
Tempo S15 w/new extra battery \$175 Tempo S1 \$95. S5 \$110.
KDK 2030 25W 2 meter FM \$175.
Yaesu FT757GX \$350.
Yaesu 757AT auto tuner \$195.
Yaesu FT 107E \$325.
Yaesu FT 107EE \$350.
Yaesu FT 101B \$325.
Yaesu FV 101B ext. VFO \$75.
Yaesu FL2100B used, mint \$325.
Yaesu FP757HD power supply \$165.
Yaesu FP757 power supply \$90.
Dentron 3KW 160-10 tuner \$150.
KLM 2-140 2 meter FM only amp, 2 in/140 out \$125.
KLM PA 10-35/C 440 FM amp, 5-15 in. 35 out \$65.
AEA CP1/64 w/MBA TextPac \$150.
Heath SB401-301 twins \$195.
Heath SB110 6 meter 100W sb/cw w/p.s. and 3 el. Hygain beam \$125.
Drake T4XR, R4B, M5 4 ps/spkr \$250.
Drake W4 wattmeter \$35.
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NOTE:

Most Japanese manufacturers have increased prices and when distributors' present inventories are gone, prices will be climbing.

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